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BUREAU OF MINES MINERALS YEARBOOK

The Mineral Industry of China

UNITED STATES DEPARTMENT OF THE INTERIOR

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The Mineral Industry of China

By E. Chin[1]

Under the seventh 5-year plan (1986-90), the Government continued to implement reform, open further to the outside world, and increase production and income. In 1987, production increased steadily, the domestic market remained brisk, economic exchanges were expanded with other countries, and achievements were made in science, technology, and social undertakings. The gross national product grew by 9.4% over that of 1986, reaching $294 billion[2] in 1987. National income was $246 billion, 9.3% higher than in 1986.[3]

Industrial reform focused on improving enterprise management. Sixty-eight percent of state-owned industrial enterprises have adopted a responsibility system invested in a director. Other reforms introduced included contract management, collective management, and leasing. Domestic horizontal economic ties between industrial enterprises were expanded further. By yearend, there were 6,780 horizontally associated industrial organizations above the county level, involving investments of $3.4 billion.

Profits of state-owned industrial enterprises were up 9.9%; per capita productivity increased 7.6%; overall product quality was maintained or improved; and industrial energy consumption was reduced by 4%. However, production costs generally increased; financial losses by less profitable enterprises rose 4.6%; and stock inventory of some products increased. All of these changes were relative to 1986.

The output value of light and heavy industry reached $318 billion, supplemented with $53 billion for the output value of village-run industry. By sector, the output value of state-owned enterprises increased 11%; collective enterprises, 25%; the private sector, 48%; and foreign-funded enterprises, 98%.

The output value of light industry was $176 billion, 16.8% more than in 1986, while that of heavy industry reached $195 billion, up 16%. The largest growth areas in production were in power generation and equipment, transportation and agricultural equipment, insecticides, and fertilizers.

The agricultural output value increased 4.7%, reaching $120 billion in 1987. Construction of farmland irrigation projects to increase agricultural production continued to be a major investment. By yearend, the aggregate power consumed by farm machinery increased 7.7%, reaching 247.2 billion watts. Power consumed by irrigation and drainage equipment was 67.9 billion watts, a 12.4% increase. Total electricity consumption in rural areas was 65.9 million kilowatt-hours, an increase of 12.3%. Application of chemical fertilizer increased 4.1%, totaling 201 million tons in 1987.

The Government continued to moderate the growth in fixed assets. The growth in this sector was reduced from 18.7% in 1986 to 16.5% in 1987, totaling $95 billion.[4] State-owned enterprises accounted for $61 billion; collectively owned enterprises, $13 billion; and individuals, $21 billion.

In state-owned enterprises, investment in capital construction increased 12.6%, totaling $36 billion in 1987. The larger investments included $8.3 billion for the energy sector, $5.5 billion for transportation and communication, $5.2 billion for raw materials, and $1 billion for light industry. The Government designated 206 projects under construction as key projects. During the year, $9.7 billion was allocated to these projects, which included oilfields, coal mines, power stations, railway lines, and

ports.

Construction of 295 projects was completed in 1987 and placed into operation. Production and other capacity added included 8.1 million kilowatts of electric power generation, 17.1 million tons of coal, 118.9 million barrels of crude oil, 272 kilometers of new railways, 433 kilometers of double-track railways, 204 kilometers of electrified railways, 9.8 million tons of port cargo handling capacity, and 3.0 million tons of cement.[5]

There was marked progress in geological surveying to delineate mineral resources. New deposits reportedly were evaluated for numerous minerals. New reserves of 31 billion tons of coal were verified. There were significant new finds of gold and other metallic deposits, industrial minerals, and oil and gas. China also conducted offshore, including deepsea, geological surveying. In 1987, a total of 8.2 million meters of mine tunneling was completed. China Geology Technology Import and Export Corp. was involved with more than 20 Sino foreign joint-venture contracts for processing diamonds, diatomaceous earths, graphite, kaolin, marble, and for manufacturing geological equipment and tools. This corporation imports computers and smelting technology while exporting mineral commodities. China Geo-Engineering Corp. has more than 20 contracts for the development of overseas mines, mostly in developing countries.

Cargo transport increased 9.2% to 2,191 billion tons-kilometer, of which 43.3% was by rail, 42.9% by water, 10.9% by highway, and 2.9% by oil and gas pipeline. The volume of cargo handled at China's major seaports was 397 million tons. Cargo carried by ships managed by the Ministry of Communication averaged 50,100 tons-kilometer, an increase of 7.4% over that of 1986. Railway and sea container transport was developing rapidly and increased 27.2% to a volume of 14.4 million tons. The use of highway transport was promoted to lessen the burden on railways. The volume of truck freight transport rose 10.5% over that of 1986.

Retail sales of all commodities continued to increase. Sales by the state-owned sector grew by 15.6%; the collective sector, 15.4%; the joint public-private sector, 26.3%; and the individual sector, 24.2%. The scope of free marketing of capital goods continued to expand, entailing a drop in materials supplied under the state distribution plan. The proportion of rolled steel under state distribution dropped from 53.1% in 1986 to 46.8% in 1987 and that of cement from 16.2% to 15.6%.

Commodity (including minerals) prices rose considerably. The urban retail price index rose 9.1% compared with 6.3% in rural areas. The average retail price index rose 7.3%. The price index for some food products rose as high as 18%, while the price index of fuel rose 3.6%.

China continued to promote exports and limit imports. In 1987, exports totaled $39.5 billion and imports $43.2 billion. Invisible trade consisting of exports and imports of services continued to expand, and invisible earnings totaled $5.38 billion, while import cost was $1.99 billion. Foreign capital increased 4.2%, reaching $7.57 billion, composed of $5.33 billion in loans and $2.24 billion in foreign investment. Contracts ratified for overseas projects and labor service totaled $1.74 billion. Overseas contracts completed in 1987 were worth $1.11 billion.

The economic strength of China's four special economic zones continued to expand. The total value of industrial output by Shantou, Shenzhou, Xiamen, and Xhuhai reached $3.0 billion, an increase of 52%, while their value of total exports reached $2.7 billion, up 114% over that of 1986. During the year, 100 foreign-funded projects went into operation. The four zones absorbed $510 million in investment, a decrease of 16% from that of 1986.

The Government continued to emphasize the development of the country's science and technology base. State prizes were awarded for 225 inventions and 807 technical items, while ministerial or local prizes were awarded for the results of 9,902 technology research projects. To promote the development of high technology, the Government approved nearly 800 research programs in 1987, involving a total investment of $54 million. The fields for these programs included biological engineering, information technology, energy, and new materials. Under the state funding for natural sciences, $35 million in subsidies were given to 2,777 projects, mostly in basic theoretical research and applied science. During 1987, nearly 4,000 projects were designated as key research projects under the seventh 5-year plan. There were 26,077 applications received by the Patent Office in 1987, and 6,811 patents were granted, more than twice as many as in 1986.

China continued to strengthen its foreign economic ties. It had active investment

protection agreements with 14 countries, and agreements were signed but not yet in force with Italy, Sri Lanka, and Switzerland. In addition to multilateral cooperation with numerous countries through organizations under the United Nations, China has signed technological cooperation agreements with countries of the Asia-Pacific region and Latin America. China is a participant in the International Monetary Fund and the World Bank. The Secretariat of the General Agreement on Tariffs and Trade (GATT) was considering restoring China's status as a contracting party. About 85% of China's total trade is with member countries of GATT. China will become a member of the United Nations Convention on Contracts for International Sale of Goods, which came into force on January 1, 1988.

By the beginning of 1987, China had opened 36 ports to foreign and Chinese ships, 18 ports to Chinese ships only, 12 ports for special services such as tourism, 19 airports for international and domestic service, and 29 frontier cities available to foreign visitors under the approval of the State Council. Aside from the 4 special economic zones, the major economic entities were 12 open coastal cities—Dalian, Qinhuangdao, Yantai, Qingdao, Lianyungang, Nantong, Ningbo, Wenzhou, Fuzhou, Guangzhou, Zhanjiang, and Beihai, from north to south.

In addition, Hainan Dao was slated as an open area. Hitherto, Hainan, an island in Nan Hai that was largely underdeveloped, was administered by Guangdong Province. In November 1987, the National People's Congress elected to elevate Hainan to the status of a Province and designated it as China's largest special-status foreign investment site. The Central Government gave Hainan special preference to spur rapid development of resources. The terms for foreign investment were to be far more preferential than those enjoyed by Shenzhen, China's largest special economic zone near Hong Kong. The first foreign company involved was CSR Ltd. of Australia in a joint venture to develop onshore oil in Hainan. Prior to Hainan's elevation to Provincial status, Atlantic Richfield Corp. of the United States discovered large natural gas deposits offshore Yinggehai. In addition to oil and gas, there are exploitable coal deposits. More than 50 mineral species have been found on the island, 33 of which have commercial development value. Those that are exploitable included minerals of chromium, cobalt, copper, gold, graphite, iron, manganese, mica, phosphate, quartz, tin, titanium, and uranium.

At the beginning of 1986, the Government began a survey of 360,000 industrial enterprises. The data collected were being processed by computer, and an analysis was completed in late 1987. The information was to be used for mapping the country's development plans for economic reform and modernization. Excerpts of the statistics were to be compiled, published, and made available to foreign parties interested in investing in China. Preliminary findings showed that there were 20 industrial cities, each with a value of gross production exceeding $2.7 billion. Collectively, they compose more than one-third of the country's value of industrial output. There were 8,285 large or medium-size industrial enterprises in China; these accounted for 43% of the value of the country's industrial output and 66% of the nation's total fixed assets. According to the survey, the largest enterprises included 11 coal mines, each with an annual production capacity of more than 10 million tons; 3 oilfields, each with an annual production capacity of more than 146 million barrels; 6 steel plants, each with an annual production capacity exceeding 2 million tons of steel; and 17 petrochemical plants. Under the seventh 5-year plan, economic development could be accelerated through domestic funding for technological transformation of existing enterprises by retooling and refurbishing and through enticing foreign investment for capital-intensive projects.

A proposal under consideration by the State Council would reduce the number of ministries and commissions from 14 to 10. Ministries such as those for rail, oil, coal, and nuclear energy would become public corporations under ministerial supervision and responsible for their own profits and losses. During the prior economic plan, the formation of public companies included China National Nonferrous Metals Industry Corp. and China National Non-Metallic Minerals Industry Corp.

PRODUCTION

China is rich in mineral resources, and its mining industry ranks high in the world in terms of mineral output. China's mine output value was estimated at $25 billion, and the value-added output of the mining industry by the processing and manufacturing sectors was $220 billion.

China's mining industry was well developed, and its output was extensive and significant by world standards. China ascended to first place in world production of cement, coal, and rare earths. It also ranks first in the production of barite and tungsten. China was a significant producer of fertilizers, fluorspar, gold, gypsum, iron ore, magnesite, manganese, salt, steel, talc, tin, and vanadium.

Table 1.—China: Estimated production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1983	1984	1985	1986	1987
METALS					
Aluminum:					
Bauxite, gross weight	1,600,000	1,600,000	1,650,000	1,650,000	2,400,000
Alumina, gross weight	800,000	800,000	825,000	825,000	1,200,000
Metal, refined, primary	400,000	400,000	410,000	410,000	615,000
Antimony, mine output, Sb content	15,000	15,000	15,000	15,000	15,000
Bismuth, mine output, Bi content	260	260	260	260	260
Cadmium, smelter	300	300	300	300	300
Copper:					
Mine output, Cu content	175,000	180,000	185,000	185,000	300,000
Metal:					
Smelter, primary and secondary	195,000	210,000	225,000	225,000	300,000
Refined, primary and secondary	310,000	310,000	400,000	400,000	400,000
Gold, mine output, Au content thousand troy ounces	1,850	1,900	r1,950	2,100	2,300
Iron and steel:					
Iron ore, gross weight thousand tons	75,000	75,000	66,000	90,000	100,000
Pig iron do.	37,380	39,980	43,600	50,200	53,900
Ferroalloys do.	900	900	r900	r1,020	1,150
Steel, crude do.	40,020	43,370	46,700	52,100	56,000
Steel, rolled do.	30,720	33,710	36,900	40,500	43,900
Lead:					
Mine output, Pb content	160,000	r180,000	r200,000	r227,000	252,000
Metal, refined, primary and secondary	195,000	195,000	210,000	240,000	240,000
Magnesium metal, primary	7,000	7,000	7,000	7,000	7,000
Manganese ore, gross weight thousand tons	1,600	1,600	1,600	1,600	1,600
Mercury, mine output, Hg content 76-pound flasks	20,000	20,000	20,000	20,000	20,000
Molybdenum, mine output, Mo content	2,000	2,000	2,000	2,000	2,000
Nickel:					
Mine	13,000	r14,000	25,000	r25,000	25,000
Smelter	13,000	14,000	22,500	22,500	22,500
Silver, mine output, Ag content thousand troy ounces	2,500	2,500	2,500	3,000	3,000
Tin:					
Mine output, Sn content	15,000	15,000	15,000	15,000	15,000
Metal, smelter	15,000	15,000	15,000	15,000	15,000
Tungsten, mine output, W content	12,500	12,500	15,000	15,000	18,000
Zinc:					
Mine output, Zn content	160,000	160,000	r300,000	r396,000	425,000
Refined, primary and secondary	175,000	185,000	275,000	335,000	375,000
INDUSTRIAL MINERALS					
Asbestos	160,000	160,000	160,000	150,000	150,000
Barite thousand tons	1,000	1,000	1,000	1,000	1,000
Cement, hydraulic do.	108,250	121,080	142,500	161,600	180,000
Fluorspar	650,000	650,000	650,000	650,000	650,000
Graphite	185,000	185,000	185,000	185,000	185,000
Gypsum thousand tons	4,300	4,800	5,000	6,500	7,200
Kyanite and related materials	2,500	2,500	2,500	2,500	2,500
Lithium minerals, all types	15,000	15,000	15,000	15,000	15,000
Magnesite thousand tons	2,000	2,000	2,000	2,000	2,000
Nitrogen: N content of ammonia do.	13,766	14,000	15,000	15,500	15,500
Phosphate rock and apatite, P_2O_5 equivalent do.	r3,400	r3,200	r1,900	r1,800	2,700
Potash, marketable, K_2O equivalent do.	29	40	40	40	40
Salt do.	16,130	16,000	14,450	17,800	18,000

See footnotes at end of table.

Table 1.—China: Estimated production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1983	1984	1985	1986	1987
INDUSTRIAL MINERALS —Continued					
Sodium compounds: Sodium carbonate, natural and synthetic thousand tons	1,793	1,880	2,000	2,100	2,100
Sulfur:					
Native do.	200	200	200	300	300
Content of pyrite do.	2,300	2,300	2,300	2,500	2,500
Byproduct, all sources do.	350	350	350	300	300
Total do.	2,850	2,850	2,850	3,100	3,100
Talc and related materials	950,000	950,000	950,000	1,000,000	1,000,000
MINERAL FUELS AND RELATED MATERIALS					
Coal:					
Anthracite thousand tons	143,000	154,000	155,000	160,000	170,000
Bituminous and lignite do.	572,000	618,000	695,400	710,000	750,000
Total do.	715,000	772,000	850,400	870,000	920,000
Coke, all types do.	34,510	35,000	39,000	41,400	45,000
Gas, natural:					
Gross billion cubic feet	480	490	510	540	550
Marketed do.	431	438	455	485	495
Petroleum:					
Crude (including crude from oil shale) thousand 42-gallon barrels	774,311	836,069	873,500	953,500	978,200
Refinery products do.	500,000	550,000	655,000	700,900	710,000

[r] Revised.

[1] Table includes data available through Aug. 30, 1988.

[2] In addition to the commodities listed for which quantitative estimates of output have been made, China is known or believed to have produced other commodities for which no estimates have been prepared.

TRADE

In 1987, the value of total trade was $82.7 billion, an increase of 12% over that of 1986. China's 10 largest trading partners, in order of value, were Japan, Hong Kong and Macao, the European Economic Community, the United States, the countries of the Association of Southeast Asian Nations, the U.S.S.R., Australia, Canada, Poland, and Brazil. Total exports were valued at $39.5 billion, an increase of 27.8% over that of 1986, while imports were $43.2 billion, up 0.7%. China's trade deficit was reduced from $12 billion in 1986 to $3.7 billion in 1987. The basic Government policy was to reduce the trade deficit by decreasing imports and increasing exports.

In its effort to expand trade, the Government initiated measures to encourage exports. These reforms included delegating more decisionmaking power to trade companies and producing enterprises. Manufacturing bases were established for the manufacture of exports. The limits on export control were relaxed to encourage freer exports. The export of finished products was encouraged, while imports of manufactures were restricted. There would be freer imports of raw materials, technology, and equipment deemed vital to the development of industry and agriculture.

On the international scene, the prices of finished products were generally higher. The reevaluation of the Japanese yen and other currencies strengthened the competitiveness of Chinese goods.

The major mineral-related trading companies were China National Chemicals Import and Export Corp. and China National Metals & Minerals Import and Export Corp. The major trade commodities, those valued at more than $100 million, were exports of coal, crude oil, and petroleum refinery products and imports of aluminum, copper, fertilizers, iron ore, soda ash, and steel.[6]

Table 2.—China: Apparent exports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1985	1986[p]	Destinations, 1986	
			United States	Other (principal)
METALS				
Alkali and alkaline-earth metals	197	605	80	Japan 475.
Aluminum:				
Ore and concentrate	491,517	562,271	181,080	West Germany 116,524; Italy 47,120; Japan 44,444.
Oxides and hydroxides	10,685	4,143	535	Pakistan 2,204; Thailand 779.
Metal including alloys:				
Scrap	106	249	--	Hong Kong 229; West Germany 20.
Unwrought	715	522	--	Hong Kong 239; Thailand 186.
Semimanufactures	4,967	5,080	7	Hong Kong 4,721.
Antimony:				
Ore and concentrate	1,867	979	--	All to Japan.
Oxides	915	1,950	--	Do.
Metal including alloys, all forms	1,203	6,198	--	Japan 3,982; Yugoslavia 2,115.
Arsenic: Oxides and acids	76	116	--	All to Hong Kong.
Beryllium:				
Oxides and hydroxides	--	10	--	All to Japan.
Metal including alloys, all forms	--	10	--	Do.
Bismuth: Metal including alloys, all forms	17	--	--	
Cadmium: Metal including alloys, all forms	--	20	--	All to Netherlands.
Chromium:				
Ore and concentrate	665	1,749	406	France 575; Hong Kong 391.
Metal including alloys, all forms	83	60	--	All to Netherlands.
Cobalt: Oxides and hydroxides	10	40	--	Singapore 25; Hong Kong 12.
Columbium and tantalum: Metal including alloys, all forms, tantalum kilograms	--	84	84	
Copper:				
Sulfate	--	360	--	Japan 278; Hong Kong 82.
Metal including alloys:				
Scrap	1,002	2,053	--	Hong Kong 1,998.
Unwrought	481	266	57	West Germany 87; Japan 67.
Semimanufactures	5,101	9,714	11	Hong Kong 9,444.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	895	324,156	--	All to Hong Kong.
Indium: Metal including alloys, all forms	--	8	--	All to Japan.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite	350	2,000	--	Greece 1,772; France 155.
Metal:				
Scrap	21,362	2,896	--	Hong Kong 2,628; Japan 266.
Pig iron, cast iron, related materials	1,927	5,725	5,481	Hong Kong 218.
Ferroalloys:				
Ferrochromium	--	134	--	All to Netherlands.
Ferromanganese	662	1,527	--	Pakistan 825; Japan 700.
Ferromolybdenum	--	81	--	All to Sweden.
Unspecified	4,996	54,571	1,173	Japan 41,904; Hong Kong 4,766.
Steel, primary forms	5,429	997	--	Thailand 977.
Semimanufactures	176,580	271,338	22,475	Hong Kong 205,400; Singapore 20,185.
Lead:				
Ore and concentrate	--	10,917	--	Japan 10,166; Thailand 701.
Oxides	876	2,069	--	Japan 885; Pakistan 514; West Germany 385.
Metal including alloys:				
Scrap	108	167	3	Hong Kong 164.
Unwrought	1,069	925	78	North Korea 693; Japan 149.
Semimanufactures	6	45	--	All to Hong Kong.
Lithium: Oxides and hydroxides	252	81	--	All to Japan.
Manganese:				
Ore and concentrate	4,427	4,320	--	Japan 3,621; Hong Kong 341.
Oxides	1,157	2,026	--	Hong Kong 1,196; Pakistan 519; Thailand 247.
Metal including alloys, all forms	383	322	--	Netherlands 201; Sweden 121.
Mercury 76-pound flasks	7,695	12,034	4,728	Hong Kong 3,425; Pakistan 841.
Molybdenum:				
Ore and concentrate	--	4,693	--	Netherlands 4,561.
Metal including alloys, all forms	51	72	25	Japan 28; West Germany 18.
Nickel:				
Ore and concentrate	--	6	--	All to Finland.
Oxides and hydroxides	--	18	--	All to Hong Kong.
Metal including alloys, all forms	69	2,242	532	Japan 1,560.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$1,296	$5,680	$1,110	West Germany $3,184; Japan $650.

See footnotes at end of table.

Table 2.—China: Apparent exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified[2])

Commodity	1985	1986[p]	Destinations, 1986	
			United States	Other (principal)
METALS —Continued				
Rare-earth metals including alloys, all forms	112	83	--	All to Japan.
Silver:				
Ore and concentrate value, thousands	--	$636	$636	
Waste and sweepings[3] do.	--	$756	--	United Kingdom $677; Japan $79.
Metal including alloys, unwrought and partly wrought do.	$12,238	$8,022	$8	France $7,986.
Tin:				
Ore and concentrate	7,702	6,399	--	Singapore 3,556; Hong Kong 1,755.
Oxides	208	1,185	--	Japan 784; Singapore 373.
Metal including alloys:				
Scrap	20	27	--	Chile 22.
Unwrought	14,164	7,633	3,023	Hong Kong 2,613; Japan 1,651.
Semimanufactures	749	327	--	Hong Kong 323.
Titanium:				
Oxides	3,397	3,902	701	Hong Kong 2,009.
Metal including alloys, all forms	100	--		
Tungsten:				
Ore and concentrate	7,136	5,595	950	Hong Kong 3,457; West Germany 675.
Oxides and hydroxides	15	--		
Metal including alloys, all forms	[r]83	141	16	Singapore 90; West Germany 33.
Uranium and thorium:				
Ore and concentrate	32	--		
Metal including alloys, all forms value, thousands	$24	$24	--	Chile $15; Pakistan $9.
Vanadium: Oxides and hydroxides	2,290	299	--	All to Japan.
Zinc:				
Oxides	2,055	3,002	--	Japan 968; Hong Kong 786; Singapore 302.
Blue powder	--	2	--	All to Hong Kong.
Metal including alloys, all forms	2,787	48,022	1,342	Hong Kong 35,062; Japan 8,382.
Zirconium: Ore and concentrate	1,107	--		
Other:				
Ores and concentrates	21,965	30,972	1,895	Hong Kong 8,196; France 6,660; Greece 6,101.
Oxides and hydroxides	8,302	343	--	Hong Kong 190; Canada 153.
Ashes and residues	4,646	6,400	238	Hong Kong 5,878.
Base metals including alloys, all forms:				
Quantity, reported	5,050	14,371	5,238	Hong Kong 5,656; West Germany 1,083.
Value only, reported thousands	$30,784	$425	--	Canada $339; New Zealand $86.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	3,086	7,147	--	Hong Kong 6,240.
Artificial:				
Corundum	22,205	36,778	627	Hong Kong 18,019; Japan 17,806.
Silicon carbide	12,878	17,786	1,401	Japan 14,072; Hong Kong 1,713.
Dust and powder of precious and semiprecious stones value, thousands	$20	--		
Grinding and polishing wheels and stones	5,069	4,711	[r]129	Hong Kong 2,538; Singapore 1,208.
Asbestos, crude	348	444	--	Thailand 343; Hong Kong 82.
Barite and witherite	971,171	492,270	389,643	West Germany 32,089; Japan 30,927.
Boron materials:				
Crude natural borates value, thousands	NA	$3	$2	New Zealand $1.
Oxides and acids	1,513	2,112	1	West Germany 552; Japan 441; Pakistan 345.
Cement	97,220	156,519	49	Hong Kong 156,319.
Chalk	17	75	1	Pakistan 56; West Germany 14.
Clays, crude	252,339	252,442	--	Japan 117,385; Hong Kong 116,961.
Cryolite and chiolite	200	50	45	Singapore 5.
Diamond:				
Gem, not set or strung value, thousands	$30,470	$10,669	$1,724	Hong Kong $4,547; Belgium-Luxembourg $3,201.
Industrial stones do.	$968	$3,771	--	Belgium-Luxembourg $2,751; Hong Kong $1,020.
Diatomite and other infusorial earth	11	219	100	Thailand 100.
Feldspar, fluorspar, related materials	433,703	80,741	--	Hong Kong 37,396; West Germany 27,077.

See footnotes at end of table.

Table 2.—China: Apparent exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1986	1987[p]	Destinations, 1986	
			United States	Other (principal)
INDUSTRIAL MINERALS —Continued				
Fertilizer materials:				
Crude, n.e.s	129	106	--	All to Hong Kong.
Manufactured:				
Ammonia	9,528	2,058	--	Hong Kong 1,863.
Nitrogenous	2,113	3,813	229	Hong Kong 2,173; Japan 617.
Phosphatic	20,624	29,706	--	Japan 29,212.
Potassic	1,411	--	--	
Unspecified and mixed	[r]47	3,272	1	Singapore 1,611; Japan 1,395.
Graphite, natural	62,801	81,109	10,030	Japan 30,944; West Germany 17,848.
Gypsum and plaster	3,082	3,503	--	Hong Kong 2,788; Singapore 511.
Kyanite and related materials	--	20	--	All to Japan.
Lime	43,555	44,125	--	Hong Kong 43,825.
Magnesium compounds, unspecified	247,362	519,046	39,515	Japan 232,626; West Germany 87,403.
Mica:				
Crude including splittings and waste	16,743	2,752	1	West Germany 2,494.
Worked including agglomerated splittings	55	60	--	France 21; United Kingdom 20; Spain 10.
Phosphates, crude	1,349	1,580	--	Japan 1,572.
Phosphorus, elemental	18	--	--	
Pigments, mineral:				
Natural, crude	595	932	--	All to Hong Kong.
Iron oxides and hydroxides, processed	5,732	5,131	13	Hong Kong 2,406; Pakistan 1,993.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$2,528	$4,815	$334	Hong Kong $4,142; Japan $174.
Synthetic do.	$78	$335	$29	Hong Kong $232; Italy $32.
Pyrite, unroasted	--	7,531	--	All to Japan.
Salt and brine	785,447	162,930	--	Hong Kong 119,012; Philippines 37,411.
Sodium compounds, n.e.s.:				
Carbonate, natural and manufactured	2,542	5,114	--	Hong Kong 4,858; United Kingdom 146.
Sulfate, natural and manufactured	8,145	102,008	--	Japan 56,711; Hong Kong 44,388.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	92,484	153,482	32	Japan 136,991; Hong Kong 13,002.
Worked	22,060	38,201	4,488	Japan 23,760; Singapore 5,641.
Gravel and crushed rock	3,065,947	4,593,455	(4)	Hong Kong 4,590,111.
Limestone other than dimension	40,523	38,125	--	Hong Kong 38,124.
Quartz and quartzite	2,962	8,230	36	Hong Kong 8,088.
Sand other than metal-bearing	1,103,276	1,270,859	--	Hong Kong 1,270,824.
Sulfur:				
Elemental:				
Crude including native and by-product	11,764	33,602	--	Thailand 24,291; Hong Kong 5,242.
Colloidal, precipitated, sublimed	6,022	761	--	Philippines 550; Pakistan 194.
Sulfuric acid	5,140	6,473	--	All to Hong Kong.
Talc, steatite, soapstone, pyrophyllite	490,669	541,125	2,994	Japan 456,318; Hong Kong 32,172.
Other:				
Crude	24,150	34,414	339	Pakistan 16,044; Hong Kong 6,114.
Slag and dross, not metal-bearing	8,258	8,935	--	Japan 7,206; United Kingdom 687.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	20	--	--	
Carbon black	2,613	3,024	--	Thailand 1,130; Hong Kong 644; Pakistan 559.
Coal:				
Anthracite and bituminous thousand tons	4,729	5,474	(3)	Japan 3,770; Hong Kong 1,078.
Lignite including briquets	759	1,040	--	All to Japan.
Coke and semicoke	18,778	25,103	--	Thailand 18,825; Japan 3,607.
Peat including briquets and litter	--	100	--	All to Japan.
Petroleum:				
Crude thousand 42-gallon barrels	116,626	183,919	30,355	Japan 95,119; Singapore 47,914.
Refinery products:				
Liquefied petroleum gas do.	163	109	--	Hong Kong 82; Thailand 15.
Gasoline do.	22,614	18,976	7,323	Japan 10,887.
Naphtha including white spirit do.	--	1,938	--	All to Hong Kong.
Mineral jelly and wax do.	561	648	48	Hong Kong 243; Singapore 157.
Kerosene and jet fuel do.	3,036	2,923	--	Japan 1,529; Hong Kong 1,394.
Distillate fuel oil do.	15,411	12,340	--	Singapore 4,902; Hong Kong 4,812; Japan 1,390.
Lubricants do.	871	1,032	425	Thailand 322; Hong Kong 191.

See footnotes at end of table.

Table 2.—China: Apparent exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1985	1986[p]	Destinations, 1986	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum —Continued				
Refinery products —Continued				
Residual fuel oil thousand 42-gallon barrels	3,366	3,783	2	Japan 2,423; Hong Kong 1,298.
Bitumen and other residues do.	27	15	--	All to Hong Kong.
Petroleum coke do.	799	773	--	Mainly to Japan.
Unspecified do.	--	56	--	All to Poland.

[p]Preliminary. NA Not available.
[1]Table prepared by Audrey D. Wilkes. Owing to a lack of official trade data published by China, this table should not be taken as a complete presentation of this country's mineral exports. These data have been compiled from United Nations information and data published by the trading partner countries.
[2]May include platinum-group metals.
[3]Excludes unreported quantities imported by Japan and Hong Kong valued at $120,000 and $105,000, respectively.
[4]Excludes unreported quantity valued at $150,000.
[5]Excludes unreported quantity imported by Japan valued at $347,000.
[6]Unreported quantity valued at $2,000.
[7]Less than 1/2 unit.

Table 3.—China: Apparent imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1985	1986[p]	Sources, 1986	
			United States	Other (principal)
METALS				
Alkali and alkaline-earth metals	--	1	--	All from Japan.
Aluminum:				
Ore and concentrate	127	--		
Oxides and hydroxides	80,972	107,787	7	Singapore 106,832; Hong Kong 632.
Metal including alloys:				
Scrap	439	1,141	504	Hong Kong 622.
Unwrought	234,421	91,519	3	Australia 65,484; New Zealand 16,134.
Semimanufactures	74,099	43,211	72	Hong Kong 16,728; Japan 11,386; West Germany 5,062.
Arsenic: Oxides and acids	--	216	--	All from Hong Kong.
Beryllium: Metal including alloys, all forms value, thousands	$2	--		
Bismuth: Metal including alloys, all forms	--	34	--	All from Japan.
Chromium:				
Ore and concentrate	16,913	47,073	--	Pakistan 25,598; Philippines 21,471.
Oxides and hydroxides	56	287	51	Japan 202.
Metal including alloys, all forms	2	--		
Cobalt: Oxides and hydroxides kilograms	--	25	--	All from Japan.
Columbium and tantalum: Metal including alloys, all forms, tantalum	(7)	4	--	Do.
Copper:				
Ore and concentrate	76,032	64,679	12,493	Canada 39,272; Philippines 17,621.
Oxides and hydroxides	54	144	--	All from Hong Kong.
Sulfate	9	2,016	--	Yugoslavia 2,000.
Metal including alloys:				
Scrap	18,916	31,681	443	Japan 16,473; Chile 10,992.
Unwrought	113,829	80,529	--	Chile 19,624; Philippines 18,513; Poland 9,001.
Semimanufactures	27,892	34,547	30	Japan 19,184; Poland 8,470; Hong Kong 5,843.
Gold:				
Ore and concentrate value, thousands	$5,107	$1,562	--	All from Philippines.
Metal including alloys, unwrought and partly wrought troy ounces	11,000	616	--	All from Japan.

See footnotes at end of table.

Table 3.—China: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1985	1986[p]	Sources, 1986	
			United States	Other (principal)
METALS —Continued				
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite	9,176,413	8,708,696	--	Australia 8,706,672.
Metal:				
Scrap	496,545	649,371	308,130	Japan 244,582; United Kingdom 81,966.
Pig iron, cast iron, related materials	2,592,775	790,185	--	Japan 713,264; Canada 52,105.
Ferroalloys:				
Ferromanganese	6,664	720	--	All from Japan.
Unspecified	974	31	24	Hong Kong 6.
Steel, primary forms	1,742,182	858,814	--	Argentina 275,183; Australia 178,990; Italy 114,306.
Semimanufactures thousand tons	14,356	11,833	17	Japan 7,732; West Germany 739; Spain 663.
Lead:				
Oxides	28	6	--	Japan 4; Hong Kong 2.
Metal including alloys:				
Scrap	1,229	1,101	--	All from Hong Kong.
Unwrought	3,423	3,116	83	Japan 1,600; Canada 1,000.
Semimanufactures	139	73	(2)	Hong Kong 42; Japan 31.
Magnesium: Metal including alloys, all forms	3,078	4,079	2,930	Japan 783; Hong Kong 366.
Manganese: Oxides	24	56	--	All from Hong Kong.
Mercury 76-pound flasks	118	--		
Molybdenum: Metal including alloys, all forms	2	1	--	All from West Germany.
Nickel: Metal including alloys, all forms	211	228	16	Hong Kong 82; Japan 73.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$4,374	$4,715	$1,006	United Kingdom $3,581.
Selenium, elemental	--	15	--	All from Japan.
Silver:				
Ore and concentrate value, thousands	$775	$6,018	$380	Canada $4,492.
Waste and sweepings do.	--	$8	--	Canada $6; Singapore $2.
Metal including alloys, unwrought and partly wrought thousand troy ounces	1,119	[4]17,306	--	United Kingdom 17,426.
Tin:				
Ore and concentrate	257	199	--	All from Hong Kong.
Metal including alloys, all forms	147	855	542	Hong Kong 296.
Titanium:				
Oxides	10,852	8,448	2,078	Japan 4,830; Hong Kong 829
Metal including alloys, all forms	--	196	--	All from Japan.
Tungsten: Metal including alloys, all forms	[5]6	6	(2)	Japan 4.
Uranium and thorium:				
Ore and concentrate	4	1	--	All from Japan.
Oxides and other compounds	--	2	--	All from Hong Kong.
Zinc:				
Ore and concentrate	21,826	2,281	--	All from Canada.
Oxides	3,311	504	--	Singapore 294; France 100.
Blue powder	--	51	--	All from Hong Kong.
Metal including alloys, all forms	181,514	47,296	--	Thailand 11,692; Hong Kong 8,301; Australia 7,171.
Zirconium: Ore and concentrate	180	--		
Other:				
Ores and concentrates	16,935	12,579	--	Australia 10,777; Hong Kong 1,802.
Oxides and hydroxides	31,147	--		
Ashes and residues	294	486	(2)	Canada 280; Hong Kong 166.
Base metals including alloys, all forms	532	885	13	Hong Kong 899.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	611	668	--	Hong Kong 607.
Artificial:				
Corundum	15	202	14	Hong Kong 136; Japan 40.
Silicon carbide	221	30	--	Hong Kong 23.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$9	$20	$3	Japan $11; Hong Kong $6.
Grinding and polishing wheels and stones	325	[6]717	9	Hong Kong 311, Italy 166; Japan 121.

See footnotes at end of table.

Table 3.—China: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1985	1986[p]	Sources, 1986	
			United States	Other (principal)
INDUSTRIAL MINERALS —Continued				
Asbestos, crude	839	254	--	Canada 243.
Barite and witherite	NA	25	25	
Boron materials: Oxides and acids	40	3	--	All from Hong Kong.
Cement	644,347	1,234,365	4	U.S.S.R. 662,000; Hong Kong 534,113.
Clays, crude	3,026	3,755	1,225	Hong Kong 1,992; Japan 446.
Diamond:				
Gem, not set or strung: value, thousands	$8,581	$10,315	$719	Belgium-Luxembourg $8,166; Hong Kong $1,573.
Industrial stones do.	$8,458	$10,257	$2,159	Belgium-Luxembourg $4,145; Hong Kong $2,342.
Diatomite and other infusorial earth	1,377	953	392	Hong Kong 417; Japan 143.
Feldspar, fluorspar, related materials	28	289	--	Hong Kong 283.
Fertilizer materials:				
Crude, n.e.s	224	301	--	Hong Kong 298.
Manufactured:				
Ammonia	1	47	--	All from Hong Kong.
Nitrogenous thousand tons	1,617	1,171	--	U.S.S.R. 996; Pakistan 42.
Phosphatic do.	84	587	--	Tunisia 256; Philippines 244.
Potassic do.	276	347	--	Canada 311; Greece 34.
Unspecified and mixed do.	960	268	--	Italy 55; Belgium-Luxembourg 46; Greece 31.
Graphite, natural	26	10	--	Mainly from Hong Kong.
Gypsum and plaster	1,262	544	16	Hong Kong 430.
Iodine including bromine and fluorine	10	170	--	Mainly from Japan.
Kyanite and related materials	--	4	--	All from Japan.
Lime	189	132	--	Japan 65; Hong Kong 47.
Magnesium compounds, unspecified	220	285	--	Japan 253.
Mica:				
Crude including splittings and waste	8	--		
Worked including agglomerated splittings	27	70	1	Hong Kong 69.
Nitrates, crude	49,998	88,466	--	All from Chile.
Phosphates, crude	111,000	244,850	--	All from Morocco.
Pigments, mineral:				
Natural, crude	--	18	--	All from Hong Kong.
Iron oxides and hydroxides, processed	1,131	923	83	Hong Kong 663; Japan 175.
Potassium salts, crude	--	188,302	--	All from Jordan.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$8,164	$12,082	$41	Hong Kong $11,198; West Germany $805.
Synthetic do.	$275	$219	--	Hong Kong $120; Australia $49.
Salt and brine	696	702	--	Hong Kong 666.
Sodium compounds, n.e.s.:				
Carbonate, natural and manufactured	187,579	767,315	212,180	Hong Kong 377,713; Poland 111,909.
Sulfate, natural and manufactured	315	141	--	All from Hong Kong.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	1,027	50,363	--	Jordan 49,600; Hong Kong 512.
Worked	10,733	10,292	182	Hong Kong 9,507; Italy 521.
Dolomite, chiefly refractory-grade	26	43	--	Hong Kong 36; Japan 7.
Gravel and crushed rock	964	967	15	Hong Kong 916.
Limestone other than dimension	2,034	1,261	--	All from Hong Kong.
Quartz and quartzite	--	79	--	Spain 70.
Sand other than metal-bearing	1,516	275	--	Hong Kong 233; Netherlands 26.
Sulfur:				
Elemental:				
Crude including native and by-product	162,610	332	332	
Colloidal, precipitated, sublimed	17	9	--	All from Hong Kong.
Sulfuric acid	16,129	104	13	Hong Kong 56; Japan 30.
Talc, steatite, soapstone, pyrophyllite	514	678	200	Hong Kong 461.
Other:				
Crude	254	364	5	Hong Kong 289; Singapore 30.
Slag and dross, not metal-bearing	6	67	--	Hong Kong 62.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	18	21	--	All from Hong Kong.
Carbon black	11,253	2,834	228	Hong Kong 2,073; Australia 321.
Coal:				
Anthracite and bituminous	524,272	472,350	--	Australia 472,343.
Lignite including briquets	7	139	139	
Peat including briquets and litter	--	285	--	Japan 272; Netherlands 13.

See footnotes at end of table.

Table 3.—China: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1985	1986[p]	Sources, 1986	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS—Continued				
Petroleum refinery products:				
Liquefied petroleum gas 42-gallon barrels	[r]58	45,228	116	Hong Kong 43,697; United Kingdom 1,392.
Gasoline do	52,955	44,732	1,504	Hong Kong 35,808; Belgium-Luxembourg 5,738.
Mineral jelly and wax do	2,723	5,579	47	Hong Kong 4,643; Netherlands 433.
Kerosene and jet fuel do	15,415	22,069	--	Hong Kong 18,310; Yugoslavia 3,658.
Distillate fuel oil do	260,530	10,540,585	300,108	Singapore 7,824,764; Hong Kong 2,393,989.
Lubricants do	147,669	217,968	10,521	Hong Kong 142,136; Japan 38,642.
Residual fuel oil do	114,080	4,044,305	122,591	Singapore 2,116,548; Hong Kong 1,763,002.
Bitumen and other residues do	19,543	7,926	--	Singapore 6,060; Hong Kong 1,151.
Bituminous mixtures do	303	352	--	Japan 182; Hong Kong 146.
Petroleum coke do	37,836	--	--	

[p]Preliminary. NA Not available.

[1]Table prepared by Audrey D. Wilkes. Owing to a lack of official trade data published by China, this table should not be taken as a complete presentation of this country's mineral imports. These data have been compiled from United Nations information and data published by the trading partner countries.

[2]Unreported quantity exported by Japan valued at $3,000.

[3]Unreported quantity valued at $5,000.

[4]Excludes unreported quantities exported by Australia and Belgium-Luxembourg valued at $3,409,000 and $4,000, respectively.

[5]Excludes unreported quantity exported by Hong Kong valued at $720,000.

[6]337 kilograms of wire valued at $50,000.

[7]Unreported quantity valued at $22,000.

[8]Excludes unreported quantities exported by Canada and the United Kingdom valued at $85,000 and $1,000, respectively.

[9]Excludes unreported quantity exported by Japan valued at $14,000.

COMMODITY REVIEW

METALS

China produces a wide array of metals. Although the output was significant in context of world production, it was inadequate to satisfy domestic demand in light of the country's large population. The output of such commodities as rare earths and tungsten was largely export-oriented, meeting domestic consumption as well as any large foreign demand. China was a net importer of metals such as aluminum, copper, and steel for its domestic requirements.

China's metals generally fell into 10 categories; the largest, by tonnage, was iron and steel. The light metal category included aluminum. The heavy metal category included antimony, bismuth, cadmium, chromium, cobalt, copper, manganese, mercury, nickel, tin, and zinc. The light rare metals were beryllium, lithium, and titanium; the refractory rare metals were columbium and tantalum, molybdenum, tungsten, vanadium, and zirconium; and the rare dispersed metals were gallium, germanium, indium, and thallium. The rare-earth metals (lanthanide series) and the platinum-group metals were each categorized into its own grouping. Gold and silver were the precious metals, while the semimetals were arsenic and silicon.

For general reporting, the Chinese literature refers to aluminum, antimony, copper, lead, magnesium, mercury, nickel, tin, titanium, and zinc as the 10 major nonferrous metals. Overall production of these metals in 1987 was about 1.5 million tons.

Overall, the output of nonferrous metals by the end of the seventh plan was to be 45% more than that at the end of the sixth plan. Individually, China National Nonferrous Metals Industry projected growth rates during 1986-90 of 90% for aluminum, 12% for copper, 31% each for lead and zinc, and 100% for nickel.[7]

Aluminum.—Consumption of aluminum exceeded 800,000 tons, of which 40% was imported. Under the current economic plan, the Government gave priority to developing the aluminum sector. New metal produc-

tion came from recently completed plants in Gansu, Guizhou, and Qinghai. When full production capacity is on-stream, total production in 1988 should exceed 600,000 tons. Further increases in metal production would come from plants under construction in Guangxi, Qinghai, and Shaanxi. By 1990, the national output capacity was expected to reach close to 1.1 million tons per year.

There were large bauxite deposits in Shanxi and in southern China, principally in Guangxi, Guizhou, and Hunan. Annual mine output of bauxite was expected to exceed 4.4 million tons by 1990 to meet the demand for metal production and for abrasive, chemical, and refractory uses. Large alumina refineries were near the minesites at Pingguo, Guanxi; Guiyang, Guizhou; and Zhengzhou, Hunan. Collectively, these refineries were to supply about 85% of China's alumina requirements.

Copper.—China's consumption of copper was 800,000 tons. Domestic metal production constituted 60% of the supply; imports, 35%; and secondary recovery, the remainder. The country's largest copper-producing operation was in Jiangxi Province centered around the Dexing mining complex and the nearby smelting-refining complex at Guixi. The annual output at Dexing-Guixi was 200,000 tons of copper in concentrate and 90,000 tons of refined metal.

Construction continued in the nonferrous metal production center at Baiyin, Gansu, in northwestern China, which includes copper smelting-refining facilities. Nearby copper deposits were to be mined to provide feed for Baiyan to produce 110,000 tons of copper per year. The only other major project for primary metal production was a proposed 100,000-ton-per-year refinery in Tianjin. A minor but expanding supply of copper was secondary metal from China's increased activities in shipbreaking.

Notwithstanding the projected production capacity of 665,000 tons per year of refined metal, China was expected to continue to import annually 250,000 tons of copper.

Gold.—The planned annual growth in gold production was 15% during 1986-90. However, the increase in gold output was 11% in 1986 and only 10% in 1987, reaching a total output of 2.3 million troy ounces. Heilongjiang, Henan, and Shandong are the main gold-producing Provinces. Output each in Hebei, Jilin, Liaoning, and Nei Monggol varies between 50,000 and 100,000 ounces annually. Although gold has been reportedly found in 1,000 counties in China, mining was being carried out in only 400 counties. Cooperatives and individuals were encouraged to mine gold, which was formerly restricted to state-owned enterprises. However, all gold output must be sold to the Government.

Prospecting has revealed 4,000 more gold finds in various localities throughout the country. Although China's gold reserves are large, they rank sixth in the world after the Republic of South Africa, the U.S.S.R., the United States, Canada, and Australia. China's gold-mining sector has an estimated work force of 100,000 encompassing prospecting to mining and research.

Iron and Steel.—China's steel industry centers around 56 plants, of which 14 produce more than 1 million tons per year. Numerous small iron and steel mills throughout the country produce one-fifth of the national output. The largest steel complex, at Anshan, Liaoning, has an annual production capacity of 7.5 million tons. Anshan was being renovated, and annual capacity was to be expanded to 10 million tons. The second-largest steel complex, at Wuhan, Hubei, was undergoing expansion to increase annual capacity from 4.5 to 7 million tons. The newly completed steel complex at Baoshan, outside Shanghai, ranks third, and upon completion of its second-stage construction, annual production capacity will increase from 3.7 million to 6.7 million tons.

During 1981-85, the annual increase in steel production averaged more than 2 million tons, and output rose from 35.6 to 46.7 million tons. During the seventh 5-year plan, the average annual increase was to be 3 million tons, to reach an annual output capacity of 64.1 million tons in 1990. Notwithstanding the planned increase in output by 1990, China will remain fourth in world production after the U.S.S.R., Japan, and the United States.

China's output in 1987 of crude steel was 56.0 million tons; rolled steel, 43.9 million tons; pig iron, 53.9 million tons; and iron ore, 151.5 million tons, representing an average increase of 8% each.

In addition to plant expansions previously mentioned, expansions were slated for the steel complexes at Ma'anshan, Anhui; Xuanhua, Hebei; Maashan, Jiangsu; Benxi, Liaoning; Laiwu, Shandong; and Panzhihua, Sichuan. New steel complexes were proposed for Meishan, Jiangsu; Shenzhen, Guangdong; and Ningbo, Zhejiang. Mini-

mills were proposed for Meizhouwan, Fujian; Guangzhou, Guangdong; and Beihai, Guangxi.

An iron and steel seminar that was to be held in Beijing in late 1987, cosponsored by the U.S. Department of Commerce and China's Ministry of Metallurgical Industry, was canceled. The seminar was to explore avenues to finance the modernization and expansion of China's steel industry. Subsequently, the State Council gave approval for the establishment of China International Iron and Steel Investment Corp., whose charter was to attract foreign funds and to import technology and equipment for accelerating the growth of the domestic steel industry.

China has 120 shipbreaking yards employing 40,000 workers. Most of the shipbreaking activities, which provide scrap metal for the steel sector, were in Dalian, Fuzhou, Guangzhou, Lianyungang, Qingdao, Qinhuangdao, Shanghai, Tianjin, Xiamen, and Yantai. Although the industry is new to China, the country was the world's third largest in shipbreaking. Moreover, the state has allocated funding to upgrade technology as well as to expand shipbreaking capacity. By 1990, China's shipbreaking capacity was expected to rank second in the world.

Lead and Zinc.—China's annual demand for lead and zinc was 185,000 tons and 500,000 tons, respectively. The large refineries were in Huludao and Shenyang in Liaoning and Zhuzhou, Hunan. Output capacity at these plants, as well as at the refinery at Shaoguan, Guangdong, was being expanded. The lead-zinc mine at Fankuo, Guangdong, was being expanded to provide feed for metal production at Shaoguan. New annual production of 50,000 tons of lead and 100,000 tons of zinc was to begin in 1988 at the nonferrous metal production center in Baiyun, Gansu. By 1989, China's annual capacity to produce lead was expected to reach 250,000 tons and for zinc, 400,000 tons. Currently, China imports 10,000 tons of lead and 200,000 tons of zinc annually.

Rare Earths.—China's verified reserves of rare earths at Bayan Obo alone were the largest in the world. Rare-earth production in 1987 reached 18,000 tons, probably replacing the United States as the world's largest producer. In addition to approximately 30 producing refineries, there are 300 universities and research institutes engaged in rare-earth extraction and application. Consumption of rare earths in China exceeds 5,000 tons per year. The uses were extensive and included mischmetal in iron and steel, petrochemicals, optical glass, tanning, dyeing, agriculture, and laser and microwave technology. China was a large exporter of rare earths and yttrium to Japan and Europe.

Tin.—China's reserves of tin were estimated to constitute as much as one-quarter of the world's total reserves. Its tin reserves were concentrated in the south, stretching from Hunan, through Guangdong and Guangxi, to Yunnan. The country's largest tin producer was Yunnan Tin Corp., followed by Dachang Tin Mining Bureau in Guangxi. The combined annual tin output of these two accounted for more than 60% of China's production of tin-in-concentrate. Although China is a tin-rich nation, it plays a minor role in world commerce, with exports averaging only 7,000 tons of ingot and 5,000 tons of ore during 1985-86.

Tungsten.—China had large resources of tungsten in wolframite and scheelite, and its reserves were equivalent to three times those of the rest of the world. The large tungsten occurrences were in southern China, mainly in Jiangxi, Hunan, and Guangdong Provinces. The mining and processing of tungsten ore was by China National Nonferrous Metals Industry, whose marketing subsidiary was responsible for exporting tungsten products. China ranks first in world production of concentrate, and its exports of tungsten products have accounted for up to 50% of tungsten world trade. Jiangxi was the largest producing Province, followed by Hunan. Ten large tungsten mines were in operation in southern Jiangxi, which was considered the tungsten capital of China.

China's exports continued to be mainly concentrates, not value-added products. In 1985, the China Tungsten Industry Association was formed in Nanchang, Jiangxi, with membership from the various mining, processing, and metallurgical operations. This association was to coordinate and assist the various tungsten mining operations and ore processors in producing higher quality goods and materials.

Inferior technology and products notwithstanding, China continued to dominate the world's export market for tungsten in 1987. By the mid-1980's, tungsten producers in Europe and the United States were petitioning for restraint in China's export volume and price. With no restraint notice-

able, U.S. producers of ammonium paratungstate (APT) and tungstic acid petitioned for official relief through the U.S. International Trade Commission (ITC). On June 5, 1987, the five commissioners of the ITC unanimously voted that there was market disruption with respect to imports from China of APT and tungstic acid for the following reasons:

1. The domestic industry has suffered losses in employment, profits, and production.

2. The economic costs of relief in terms of consumer cost, inflationary impact, and national economic welfare would be small because of the small size and structure of the domestic industry.

3. Relief will help maintain a viable domestic processing industry, because tungsten was a strategic metal and the legislated national stockpile was based on continued domestic processing capabilities.

4. Imports from China were at very low levels around 1980 but nearly tripled between 1982 and 1986, when they accounted for 85% of imports and 17.8% of U.S. consumption. Imports from China as a percentage of consumption had risen to 28.6% in the first 4 months of 1987.

5. Other countries were considering protecting their producers, which would increase pressure on the U.S. market to absorb additional imports.

6. An orderly marketing agreement was likely to deal more effectively with possible circumvention of the import restrictions.

On September 28, 1987, the Governments of the United States and China entered into an orderly marketing agreement with respect to trade in APT and tungstic acid, effective October 1, 1987. Chinese exports to the United States were restricted as follows:

	Specified limit (million pounds of tungsten content)
If entered during the period from Oct. 1, 1987, through Dec. 31, 1987, inclusive	0.425
If entered during the period from Jan. 1, 1988, through Dec. 31, 1988, inclusive	1.81
If entered during the period from Jan. 1, 1989, through Dec. 31, 1989, inclusive	1.94
If entered during the period from Jan. 1, 1990, through Dec. 31, 1990, inclusive	2.05
If entered during the period from Jan. 1, 1991, through Sept. 30, 1991, inclusive	1.50

To offset U.S. quota limitations, China was expected to increase its exports of tungsten in the form of ore and concentrate; miscellaneous compounds; metal, alloys, and carbide; and waste and scrap to offset the loss in shipments of APT and tungstic acid.

INDUSTRIAL MINERALS

China's production of industrial minerals was large and extensive. The industry was largely composed of the Ministry of Chemical Industry (MCI) and the State Administration of Building Materials (SABM). MCI employs more than 2.8 million people in more than 550 chemical works, while SABM has more than 4 million people in 50,000 enterprises. MCI was responsible for pyrite, phosphate and chemical fertilizer, sulfur, caustic soda, soda ash, and a wide spectrum of other chemical products. SABM's jurisdiction included cement and ceramics, glass, and other products including asbestos, clays, graphite, gypsum, magnesite, and mica.

Other companies included China Petro-Chemical Corp., also known as SINOPEC, and China National Non-Metallic Minerals Industry Corp. Although China's output of industrial minerals was largely domestically consumed, the large excesses in production of barite, clays, feldspar, fluorspar, graphite, magnesite, and talc were exported.

Barite.—China was one of the world's largest producers of barite. The largest mining operations were in Guangxi and Guizhou, constituting collectively more than 75% of the national output. Significant barite resources exist in Fujian, Hubei, Hunan, and Shandong. Because of the low world price of petroleum, China's export of barite used as a drilling mud declined from 1.1 million tons in 1982 to 0.8 million tons in 1987. Close to 71% of China's shipments of barite was to the United States.

Bauxite.—China was a significant producer of both metallurgical and refractory bauxite from mining operations in Guangxi, Guizhou, Hunan, and Shandong. In 1987, exports of bauxite totaled 516,000 tons. Shipments to the United States included 148,000 tons of refractory-grade bauxite and 136,000 tons of metallurgical-grade bauxite.

Fluorspar.—China had historically been a major producer and exporter of fluorspar. Annual mine output may be more than 1 million tons. During 1986-87, exports of fluorspar have averaged more than 700,000 tons per year with about one-half of the annual shipments destined for Japan. In 1987, fluorspar shipments to the United

States were 38,377 tons valued at $2.9 million.

Magnesite.—China's largest magnesite mining operation was southeast of Anshan in Liaoning Province, which was perhaps the largest magnesite deposit in the world. Annual mine output of magnesite was estimated at 2 million tons. About one-quarter of the production was exported principally to Japan with lesser quantities to the Federal Republic of Germany. Shipments to the United States were 52,006 tons valued at $7.1 million.

Talc.—China was a major producer of talc with annual mine output estimated at 1 million tons. The three large talc mining bases were Long Sheng in Guangxi, Hai Cheng in Liaoning, and Hai Yang and Ye Xian in Shandong. In 1987, total exports of talc were 638,009 tons with more than one-half shipped to Japan. U.S. receipts of Chinese talc were small, valued at $563,000.

MINERAL FUELS

Energy development remained a key element in the national economy. The country's installed thermal-power electric generating capacity was 73 million kilowatts, accounting for 70% of the total power generating capacity. In 1988, 496 billion kilowatt-hours of electricity was produced, of which only 99.5 billion kilowatt-hours was from hydropower plants.

In addition to 1,500 small- and medium-size thermal powerplants, China had 75 plants each with a generating capacity of more than 250,000 kilowatts, and 6 powerplants each with an installed capacity of more than 1 million kilowatts. There were four large power grids each with a capacity of more than 10 million kilowatts. Thermal powerplants under construction mainly in the open coastal cities, major ports, and coal-producing areas have a combined generating capacity of more than 30 million kilowatts.

China imports large power-generating equipment. However, the power machinery plant in Harbin can produce thermal power generating units with capacities up to 600,000 kilowatts. The other power-generating equipment manufacturing facilities were in Beijing, Deyang, and Shanghai. The manufacturing bases for power transformers and transmission equipment were in Xi'an and Shenyang.

China's plans for nuclear power generation were minimal. Construction of a 300-megawatt plant at Qinshan in Hangzhou Bay was under way. Startup of the nuclear powerplant with two 900-megawatt reactors at Daya Bay in Guangdong was expected in 1992.

There were four experimental stations for wind-driven generators in China—Beijing, Jiangsu, Nei Monggol, and Zhejiang. Wind power generators were an effective means to ease power shortages in pastoral and remote areas. There were about 10,000 sets of 50-watt to 100-watt wind power generators in use in Nei Monggol. An 800-kilowatt wind power station, the largest in China, was in operation on an island off Fujian.

Two types of 3,000-watt wind power generators to be used in north and south China have passed technical appraisal and were undergoing further testing. In addition, the design of a 200-kilowatt generator had been completed. China's potential wind power energy exceeds 1 billion kilowatts, of which 160 million kilowatts was considered of harnessable value. China's utilization of other nonconventional energy sources included geothermal steam, biogas, and animal chips.

Coal.—China's premier energy source was coal, which accounts for 76% of all fuel consumption. Hence, the development of the coal industry was given high priority. China had large coal resources with verified reserves in excess of 800 billion tons. The verified reserves in Shanxi and Nei Monggol alone accounted for more than 50% of the nation's total. There were also large coal reserves in Anhui, Guizhou, Ningxia, and Shaanxi.

In 1987, there were 27 new mines that went into operation, raising coal production capacity by 24 million tons. Total mine output of coal was 925 million tons, an increase of 6% over production in 1986. The target for increasing coal production was 25 million tons per year in the present economic plan and in the ensuing 5-year plan, which ends in 1995. At yearend 1995, annual coal production capacity was expected to reach 1.1 billion tons. Smaller subsequent increases in annual production capacity were planned, so that by the year 2000, coal production would reach 1.2 billion tons per year.

The largest coal mine in China was at Antaibao, in Pinglu and Shuoxian Counties in the Province of Shanxi. This surface mine was a joint venture between Island Creek of China Coal Ltd. (52.5%), a subsidiary of Occidental Petroleum Corp. of the United States, and Pingshuo First Coal Corp. (47.5%). The mine was developed with

a total investment of $650 million. It covers 18.5 square kilometers and contains coal reserves of 450 million tons in eight seams; three seams were currently being mined. The mine was designed to produce 15 million tons of raw coal per year, which would yield 12 million tons of marketable coal—9.4 million tons for export and 2.6 million tons for domestic use. The coal preparation plant had four independent automated systems, each capable of washing 750 tons of coal per hour.

The transportation of coal from the Antaibao Mine to the Port of Qinhuangdao on the shore of Bohai Bay, some 890 kilometers east, will be by rail. The modern rail link would provide low cost transportation for the coal. A new single rail line had been completed, which would be electrified and double-tracked by 1989. The coal facilities at the port will also be upgraded by early 1989 to accommodate a 1.5-million-ton stockpile and a 30-million-ton-per-year throughput, making it the largest coal terminal in China.

Development of China's largest coalfield was in progress at Shenfu in the northern tip of Shaanxi Province. The verified reserves at Shenfu total 150 billion tons, covering an area of 13,000 square kilometers. Shenfu had high-quality coal with low ash, sulfur, and phosphorus content. Large coal seams lie near the surface, facilitating extraction. A 169-kilometer-long railway line was being constructed to link the mine with Baotao, Nei Monggol. Upon completion in 1988, the railway would transport 10 million tons of coal annually. Also under construction were auxiliary projects such as highways, bridges, and infrastructure for housing, commercial facilities, and telecommunications.

New coal mines under construction in China have a combined annual production capacity of 140 million tons. In addition, 77 state-owned coal mines were being modernized by upgrading production technology and equipment. Large mines newly commissioned and in full production included Zhenchengdi, Shanxi (annual production capacity of 4.5 million tons); Yangquan No. 2, Shanxi (4.4 million tons); Duerping, Shanxi (3.0 million tons); and Nanshan, Heilongjiang, (2.4 million tons).

There were more than 60,000 local coal mines, which accounted for more than 50% of the national output. In state-owned mines, 50% of the coal was mined by machines in the large mines. The national capacity for coal washing was minimal at 140 million tons.

China exported 16 million tons of high-quality coal to Japan, North Korea, the Philippines, France, Indonesia, Belgium, Denmark, Hong Kong, and other countries. The origin of exported coal included the mines at Datong, Huaibei, Kailuan, and Zaozhuang. Most of the coal was shipped from the Ports of Lianyungang, Shijiushuo, and Qinhuangdao. Under the seventh 5-year plan (1986-90), coal exports were to total 100 million tons.

Petroleum and Natural Gas.—In 1987, production of crude oil totaled 978 million barrels. The bulk of the output was from onshore wells; less than 1% was from offshore production. The Daqing Oilfield in Heilongjiang, China's largest oil-producing base, produced 409 million barrels, or 40% of the national output, followed by Shengli Oilfield in Hebei with 219 million barrels, and Liaohe Oilfield in Liaoning with 80 million barrels. Most of the remaining production was from oilfields in Dagang, Huabei, Junggar, and Zhongyuan. More than 7 billion barrels of oil reserves were added to the national total as a result of new discoveries in east China—Daqing, Shengli, Liaohe, Zhongyuan, Dagang—and other parts of the country including Xinjiang, Qinghai, Gansu, Nei Monggol, and Guangxi. The small production offshore was from two operations in Bohai (Weizhou and Beibu) and an operation at Wei in Nan Hai. Three oil-bearing structures were discovered in the Gulf of Liaodong. Oil and gas discoveries were also made in Liaodong, at the mouth of the Pearl River, and in Bohai. A large, deep gasfield was discovered on the banks of the Huang He, and new gas reserves were reported in eastern Sichuan. In addition, fields with more than 175 billion cubic feet of gas reserves have been discovered in Yinggehai and in the Tarin Basin in Xinjiang. China's reserves of natural gas were estimated to be more than 700 trillion cubic feet. The production of natural gas in 1995 was expected to double the present output level.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Chinese renminbi (RMB) to U.S. dollars at the rate of RMB3.72=US$1.00 for 1987.

[3]Beijing Review (Beijing). Communique on the Statistics for 1987 Socio-Economic Development. V. 31, No. 10, Mar. 7, 1988, pp. 1-8.

[4]Economic Information & Agency (Hong Kong). Statistical Yearbook of China 1986. Dec. 1986, 761 pp.

[5]China Book Resources Ltd. (Hong Kong). People's Republic of China Year Book 1987. Oct. 1987, 646 pp.

[6]China Resources Advertising Co. Ltd. (Hong Kong). Almanac of China's Foreign Economic Relations and Trade 1987. Aug. 1987, 949 pp.

[7]Huang Jichun. The Rising of China's Nonferrous Metals Industry. China National Nonferrous Metals Industry Corp. (Beijing), 1987, 14 pp.

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